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EXAMINER	
GAWORECKI, MARK R	

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2884	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/539,837	BROENNIMANN ET AL.	
	Examiner	Art Unit	
	MARK R. GAWORECKI	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 June 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/17/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because Figures 1-4, 6, and 9 contain text and shaded areas that become illegible when reproduced electronically. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "layer of photosensitive material" in which the photodiodes are arranged must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

3. Claims 6, 7, 10, 14-18, and 23-25 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other

multiple dependent claim. With further respect to claim 10, a claim also cannot depend upon itself. See MPEP § 608.01(n). Accordingly, the claims have not been further treated on the merits.

4. The claims contain a number of typographical and grammatical errors, for example, claims 1 and 13 are objected to because of the following informalities:

Claim 1 contains a grammatical error in the phrase, "**a source** of threshold voltage **supply**".

Claim 13 contains a typographical error in the phrase, "and a of pitch of".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 5, 9, 11, 13, and 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a

question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949).

In the present instance, claim 5 recites the broad recitation "in said high gain voltage amplifying means", and the claim also recites "preferably in the comparator unit", which is the narrower statement of the range/limitation.

Further, claim 9 recites the broad recitation "in a range of 30 to 120°", and the claim also recites "preferably substantially 45 to 100°", which is the narrower statement of the range/limitation.

Further, claim 11 recites the broad recitation "having N=1 columns and M>1 [rows]", and the claim also recites "preferably $10 < M < 10^5$, rows", which is the narrower statement of the range/limitation.

Further, claim 13 recites the broad recitations "width of about 5 to 50 μm", "length of about 0.5 to 50 mm", "a pitch of 10 to 100 μm", and corresponding narrower statements of the range limitations, "preferably about 10 to 20 μm", "preferably 5 to 10 mm", and "preferably 25 to 75 μm", respectively.

Further, claim 24 recites the broad recitation "in the range of 10 to 500 MHz", and the claim also recites "preferably about 100 MHz", which is the narrower statement of the range/limitation.

5. Claims 1-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 1, 11, and 19, these claims require "a layer of photosensitive material" wherein the array of photodetector diodes is "arranged in said layer of photosensitive material". These claims appear to require an additional photosensitive material in which the photodetector diodes are placed. Neither the drawings nor the specification offer additional guidance as to the presence or nature of this material, aside from re-stating the claim wording.

Claims 2-10, 12-18, and 20-25 are likewise rejected for reasons of dependency.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 2, 4, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum *et al.* (5,665,959), in view of Moulsley (5,856,666).

With respect to claim 1, Fossum discloses a photon-counting imaging device comprising a layer of photosensitive material; a source of bias potential (reference potential, claim 1); a source of threshold potential (reference voltage charge, claim 1); a photodetector diode array arranged in the layer of photosensitive material (N x V array, claim 1), each of the diodes having a bias potential interface and an output interface (N x V array, claim 1); an array of high gain, low noise readout cells (abstract), wherein each cell comprises a comparator unit (unit-cell amplifiers discriminating between presence or absence of photoelectrons; column 7, lines 11-15) and a digital counter unit (digital counters, column 5, lines 42-58); a multiplexing means for addressing rows (column 5, lines 42-58); an output means (storage); and a data processing (control unit, Fig. 7) means connected to the multiplexing means (Fig. 7). Fossum does not show a multiplexing means which comprises both a row select and a column select circuit. However, such multiplexing means are known in the art, as exemplified by Moulsley (Fig. 3; column 4, lines 12-20). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a multiplexing system such as that of Moulsley, as Moulsley discloses the use of such a multiplexing means in electrical element arrays, such as that of Fossum (abstract).

With respect to the limitation "for single x-ray counting", it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a

prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham,* 2 USPQ2d 1647 (1987).

With respect to claim 2, Fossum teaches using bump bonding to connect the output of the photodetector diodes to the readout unit cells (column 5, lines 42-58).

With respect to claims 4 and 5, Moulsley teaches that the control unit uses a series of switches to engage or disengage a particular unit (Figs. 4A, 4B, and associated descriptions).

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum *et al.* and Moulsley, in further view of Fossum *et al.* (5,236,871).

With respect to claim 3, Fossum, as applied above, specifically makes reference to the method of U.S. Pat. No. 5,236,871, by the same inventor, which teaches Indium bump bonding (column 1, lines 39-53).

9. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum *et al.* and Moulsley, in further view of Matcher (GB 2,294,540 A).

With respect to claim 11, Fossum, as applied above, does not teach the photodiode array to be designed as a microstrip detector. However, such photodiode arrays are conventionally known in the art and would have been an obvious design choice to one having ordinary skill in the art, as discussed by Matcher (Pg. 2).

With respect to claim 12, see the rejection of claim 1 above.

With respect to claim 13, the combination as applied to claim 11 above, does not specify the exact size ranges of the elements used in the photodetector diode array. However, it would have been an obvious matter of design choice to select a size in the given ranges, especially given the indefinite ranges as claimed, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose,* 105 USPQ 237 (CCPA 1955).

10. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum *et al.* and Moulsley, in further view of Gruss *et al.* (5,107,103).

With respect to claim 19, the combination as applied to claim 1 above, does not specifically show assigning an output signal with a time stamp. However, the practice of assigning a time stamp to a detected signal from a photodiode array is commonly known in the art and would have been obvious to one having ordinary skill in the art at the time the invention was made. Gruss is cited as an example of such practice (column 3, lines 40-65).

11. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum, Moulsley and Gruss, in further view of Colbeth *et al.* (5,970,115).

With respect to claim 20, the combination as applied to claim 19 above, does not teach selecting a particular region of interest during detection. However, pre-selecting a particular region of a detector array is conventionally known and would have been obvious to one having ordinary skill in the art at the time the

invention was made. Colbeth is cited as an example of such a system (column 6, lines 31-51).

Allowable Subject Matter

12. Claims 8, 9, 21, and 22 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter:

With respect to claims 8 and 9, the prior art of record, as applied above, does not show the sensor array and readout cells to be on a flat support plate and control board on a second flat support plate, wherein the two boards are angled with respect to one another.

With respect to claims 21 and 22, the prior art of record, as applied above, does not disclose or suggest specifically time-stamping an incident photon in a pre-determined region of interest.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARK R. GAWORECKI whose telephone number is (571)272-8540. The examiner can normally be reached on Monday through Thursday, 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MG/
25 April 2008

/David P. Porta/
Supervisory Patent Examiner, Art Unit 2884